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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/594,718

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Yoshiki Nishibayashi

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EXAMINER

MILLER, DANIEL H

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

12/07/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/594,718	Applicant(s) NISHIBAYASHI ET AL.	
	Examiner DANIEL MILLER	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/20/2009 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9-12 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Regarding independent claim 9, applicant has added the claim language requiring "the mask having a shape of a circular cone and a circular truncated cone"

5. It is not clear how the shape can be both circular cone shaped and a circular truncated cone shaped at the same time. The language as written is considered indefinite. Correction required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 2001015012 (translation).

8. JP '012 teaches an emitter formed from pyramid shaped diamond protrusions having a height of 1 micrometer and a density of 25 projections per micrometer [0014-16].

9. Therefore, given the density of the diamond tips and the height of the tips the emitter would inherently have an apex angle within applicant's claimed range.

10. Regarding the 102 rejection, and in response to applicant's argument that the JP reference does not teach a predetermined arrangement, this argument is found to be unconvincing. The masking and lithographic formations of the process of the JP 2001 reference and deposition of diamond particles (while the substrate is masked) inherently effects the arrangement of the needle like carbon projections. Therefore, to the extent to which the claim to a "predetermined arrangement" distinguished the final product the claim limitation is considered to be met. No patentable distinction is seen.

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11. Regarding independent claim 14, applicant has added the claim language requiring that "the plurality of carbonaceous material projections being formed by etching using a mask."

12. Regarding independent claim 15, applicant has added the claim language requiring that the "conical shape being formed by etching a mask." The newly added limitations to the product claims 14 and 15 are considered product by process limitations that are not necessarily indicative of patentability of a claim to the product where in the structure is otherwise taught. In the instant case the structure is the same regardless of how it was formed. No patentable distinction is seen.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2001015012 (translation) in view of Baik (Thin Solid Films 377-378 (2000) 29-302) further in view of Cathey (US 6,423,239) and Ageno (US 5,449,435).

15. JP '012 teaches an emitter formed from pyramid shaped diamond protrusions having a height of 1 micrometer and a density of 25 projections per micrometer [0014-16].

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16. Baik teaches a method of producing a group of cone shaped diamond protrusion by using a patterned mask (wherein the method is concerned with uniformity). The silicon based mask is first applied as a uniform layer, then the mask is ion etched of into a pattern (removing portions of it and leaving holes), then the diamond layer is etched using an air plasma (laser) source. The mask dots have an edge that is considered to be inversely tapered from the aperture opening when formed by the etching process (see figures). Baik teaches that by varying the thickness and diameter of the patterned mask as well as processing time the sharpness of the tips (and therefore the diameter of tips, and aspect ratio, and apex angle) of the cone shaped diamond protrusions can be controlled.

17. Cathey (US 6,423,239) teaches a substantially similar method of producing a cone shaped protrusion with a two layered (30 and 32 from figures) masking and resist system.

18. Ageno (US 5,449,435) et al teaches a diamond protrusion produced using a multilayered masking and resist layer (see figures). The mask layer 202 (figures 5-11) is capable of being fabricated by several different methods, such as photolithography or a combination of deposition, photolithography, and etching processes to produce a hard mask such as a silicon-nitride mask. By selecting a preferred masking material, greater latitude of processing parameters is capable of being realized.

19. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed process and product, given what is known by one of ordinary skill in the art, the substantial similarity of the above disclosed processes and

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the desired product of JP'012 and include a multilayered mask of Cathey to obtain sharper tips, and an optimal silicon nitride layer of stoichiometrically stable proportions (obtaining applicant's claimed range) as a masking layer in order to achieve a greater latitude of processing parameters, wherein the greater latitude in processing parameters would allow for the processing time to be manipulated so that the size of the tips (and therefore the diameter of the tips, aspect ratio, and apex angle) of the cone shaped diamond protrusions can be controlled to form structures consistent within the parameters of Baik and applicant's claimed invention. No patentable distinction is seen.

20. Given the density of the diamond tips taught by JP '012 and the height of the tips the emitter (1 micron), one of ordinary skill would expect that the apex angle would inherently be within applicant's claimed range; or in the alternative it would have been obvious to provide the apex angle, as claimed, or to naturally arrive at an apex angle within the disclosed range through the use of the above described known techniques, given the similarities between the claimed methods and the combined taught method, in order to form the density of protrusions taught by JP '012. No patentable distinction is seen.

21. Regarding independent claim 9, applicant has added the claim language requiring "the mask having a shape of a circular cone and a circular truncated cone"

22. See *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966); where the court held that configuration (or shape) was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration was significant. In the instant case, to the extent to which there is a

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difference in shape of the masking layer, which the examiner is not convinced exists given the shape of the final product, the shape of the mask is considered a choice which a person of ordinary skill in the art would have found obvious in order to form the circular cone shape of the cited arts final product. No patentable distinction is seen.

23. Regarding independent claim 14, applicant has added the claim language requiring that "the plurality of carbonaceous material projections being formed by etching using a mask." Regarding independent claim 15, applicant has added the claim language requiring that the "conical shape being formed by etching a mask." The newly added limitations are considered product by process limitations that are not necessarily indicative of patentability of a claim to the product where in the structure is otherwise taught. In the instant case the structure is the same regardless of how it was formed. No patentable distinction is seen.

Response to Arguments

24. Applicant's arguments filed 11/20/2009 have been fully considered but they are not persuasive.

25. Regarding independent claim 9, applicant has added the claim language requiring "the mask having a shape of a circular cone and a circular truncated cone"

26. It is not clear how the shape can be both circular cone shaped and a circular truncated cone shaped at the same time. The language as written is considered indefinite (see 112 second paragraph rejection above).

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27. See *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966); where the court held that configuration (or shape) was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration was significant. In the instant case, to the extent to which there is a difference in shape of the masking layer, which the examiner is not convinced exists given the shape of the final product, the shape of the mask is considered a choice which a person of ordinary skill in the art would have found obvious in order to form the circular cone shape of the cited art. No patentable distinction is seen.

28. Regarding independent claim 14, applicant has added the claim language requiring that "the plurality of carbonaceous material projections being formed by etching using a mask." Regarding independent claim 15, applicant has added the claim language requiring that the "conical shape being formed by etching a mask." The newly added limitations are considered product by process limitations that are not necessarily indicative of patentability of a claim to the product where in the structure is otherwise taught. In the instant case the structure is the same regardless of how it was formed. No patentable distinction is seen.

29. Regarding the 102 rejection, and in response to applicant's argument that the JP reference does not teach a predetermined arrangement, this argument is found to be unconvincing. The masking and lithographic formations of the process of the JP 2001 reference and deposition of diamond particles (while the substrate is masked) inherently effects the arrangement of the needle like carbon projections. Therefore, to the extent to

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which the claim to a "predetermined arrangement" distinguished the final product the claim limitation is considered to be met. No patentable distinction is seen.

30. Regarding the 103 rejection, and applicant's arguments that none of the references teach a mask and resist system, it is noted that Cathey (US 6,423,239) teaches a substantially similar method of producing a cone shaped protrusion with a two layered (30 and 32 from figures) considered to meet applicant's definition of a masking and resist system. No patentable distinction is seen.

31. Further, even if applicant's arguments regarding the order of the layers were found to be convincing, the order of the layers is not considered to be patentably distinguishing since the layers can easily be reversed and one of ordinary skill would expect to be able to achieve successful etching. No patentable distinction seen.

32. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed process and product, given what is known by one of ordinary skill in the art, the substantial similarity of the above disclosed processes and the desired product of JP'012 and include a multilayered mask of Cathey to obtain sharper tips, and an optimal silicon nitride layer of stoichiometrically stable proportions (obtaining applicant's claimed range) as a masking layer in order to achieve a greater latitude of processing parameters, wherein the greater latitude in processing parameters would allow for the processing time to be manipulated so that the size of the tips (and therefore the diameter of the tips, aspect ratio, and apex angle) of the cone shaped diamond protrusions can be controlled to form structures within the parameters of Baik and applicant's claimed invention. No patentable distinction is seen.

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33. Given the density of the diamond tips taught by JP '012 and the height of the tips the emitter (1 micron), one of ordinary skill would expect that the apex angle would inherently be within applicant's claimed range; or in the alternative it would have been obvious to provide the apex angle, as claimed, or to naturally arrive at an apex angle within the disclosed range through the use of the above described known techniques, given the similarities between the claimed methods and the combined taught method, in order to form the density of protrusions taught by JP '012. No patentable distinction is seen.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL MILLER whose telephone number is (571)272-1534. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/
Supervisory Patent Examiner, Art Unit 1794

/Daniel Miller/
Examiner, Art Unit 1794